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American Potato Journal

Published Monthly by

THE POTATO ASSOCIATION OF AMERICA

East Lansing, Michigan

VOLUME VII **APRIL, 1930** **NUMBER 4**

C-O-N-T-E-N-T-S

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Entered as second class matter at East Lansing, Michigan, March 4, 1928, under Act of March 3, 1879

Accpted for mailing at special rate of postage provided for in section 412, Act of February 28, 1925, authorized on March 14, 1928.

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EAST LANSING, MICHIGAN

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The Effect of High Yields on Cost of Production In Colorado

C. H. METZGER and T. H. SUMMERS, Colorado Experiment Station, Fort Collins, Colo.

The disastrous season of 1928 has centered the attention of the potato industry on marketing problems and especially on the handling of surplusses and their resultant effect on prices. It has been suggested many times that these marketing problems may often be solved or partially solved in the production phase. Manufacturing concerns have long realized that cost of production is the major item in determining the margin of profit and have devoted considerable time to a study of this cost of production and the possibility of lowering it by reducing labor costs through the use of improved machinery. They have also made every possible effort to increase their volume of business in order to lower their unit cost.

Agriculture is just beginning to make use of these business principles. Four men and a tractor now plant twenty-five acres of potatoes in a day, where two men and a team formerly planted four acres. One man and a tractor cultivate around ten acres a day where one man and a team formerly cultivated five acres. We will soon have a three row digger which will make it possible for two men and a tractor to dig fifteen to twenty acres a day instead of four to ten. We will soon have a machine to sort and sack as it digs. These are all reductions in labor costs by the employment of modern machinery. As labor constitutes from thirty-five to fifty per cent of the cost of production in Colorado, these new methods are of some assistance in lowering the cost of production. These practices all tend to lower the cost per acre and when distributed to a large number of units,

through high yields, produce the lowest cost per unit. The yield corresponds to the manufacturers volume and the overhead varies but little whether the yield be small or large. The plowing, harrowing, discing, floating, seed, planting, cultivation, irrigation, and the operation of the digger cost just the same whether the yield is high or low. On a given farm, the cost of sacks, twine, picking, sorting, bucking, hauling to the cellar, storing, resorting and hauling to the car is greater per acre in a large crop but is the same per unit regardless of the size of the crop.

The cost figures given in this paper are all based on a hundred weight delivered in the car ready for shipment. This may lead to some confusion in the cost per hundred where some growers shipped directly from the field and others shipped stock which had a storage and resorting charge. However, the examples used here are all handled as nearly alike as possible and in all possible cases the figures cover a period of years on the same farm rather than a comparison on different farms, because hauling distance, land values, taxes, and water rent vary in different localities.

Colorado growers have no expense for commercial fertilizer or for spraying, as both of these practices are unnecessary. However, they do have a water charge which growers in some other states do not have. The average cost in the San Luis Valley, where all these records were obtained, is around eighty-eight cents per hundred and the average yield around one hundred ninety bushels.

Table 1 shows the relation between yields and cost per hundred delivered in the car on twenty-six farms during 1925, 1926 and 1927.

TABLE 1

No. of Farms	Average Yield (cwt.)	Average Cost per (cwt.)
2	38	$1.30
6	78	1.21
9	132	.69
9	184	.59

It will be seen from this table that increasing the yield from seventy-eight hundred, which is the average for the state to one hundred eighty-four hundred, lowered the cost from $1.21 to $.59. An average of two hundred sacks per acre is the aim of

TABLE 2

The Cost of Producing Potatoes in the San Luis Valley of Colorado on Individual Farms for a Series of Years

	Year	Acres	Cost per Acre	Yield per Acre (cwt.)	Cost per (cwt.)
L. G. Shutte, Monte Vista	1928	18	$107.33	224	$ .48
	1929	15	142.97	315	.45
	Av.	16.5	125.15	270	.46
J. W. Prentice, Monte Vista	1928	30	98.33	211	.47
	1929	40	90.77	225	.40
	Av.	35	94.55	218	.44
Lyman Wright, Monte Vista	1929	50	69.14	88	.79
	1928	79	100.62	172	.58
	Av.	64	84.88	130	.65
F. E. Goff, Monte Vista	1926	6	104.09	129	.81
	1928	27	89.99	152	.57
	1927	25	85.10	158	.54
	1929	20	119.31	222	.54
	Av.	19.5	99.62	165	.61
Chas. Mahl, Monte Vista	1926	16	102.36	99	1.04
	1928	10.7	116.50	162	.72
	1927	20	155.45	231	.67
	1929	11	138.59	230	.60
	Av.	14.4	128.90	180	.72
W. E. Lutz, Alamosa	1927	20	139.86	56	2.50
	1926	17	129.49	134	.97
	1928	20	121.91	220	.55
	Av.	19	130.42	137	.95
J. J. Schecter, Alamosa	1927	20	86.52	106	.82
	1926	26	52.55	84	.62
	Av.	23	69.53	95	.73
John Fultz, Alamosa	1927	30	76.74	73	1.05
	1926	40	100.21	179	.56
	Av.	35	88.48	126	.72
C. P. McKelvie, Monte Vista	1929	4	193.20	456	.42

every conscientious potato grower in the state. It will be seen from these figures that such achievement would mean a profit any year, except possibly in 1928.

As already stated above, there is considerable variation in the cost of production of similar yields on different farms. For this reason a study of costs and yield were made on individual farms over a period of years. These studies are presented in Table 2.

It will be noted that even here there is considerable variation. These variations may be due to a number of factors such as higher picking cost, application of manure to one crop and not to another, higher cost of hauling because of bad roads, greater losses in storage, or small percentage of marketable stock because of disease. The higher yields, however, show a very marked reduction in cost. A summary of this table shows very clearly that the cost is inversely proportional to the yield.

TABLE III

No. of Records	Ave. Cost per Acre	Ave. Yield per Acre (Cwt.)	Cost per Cwt.
5	88.13	80	$1.20
3	106.70	123	.87
5	98.48	165	.60
7	118.81	223	.53
1	142.97	315	.45
1	193.20	456	.42

Here again we see that a grower obtaining the average yield for the state pays $1.20 per hundred for his potatoes while a grower, who makes the 600 Bushel Club, pays only a little over a third of this amount or forty-five cents per hundred.

The 1928 season was one of the most disastrous in the history of the potato industry. The two records in Table IV were taken during that year on two farms in the same locality. Farm No. 1 produced an average of two hundred twenty-four cwt. on eighteen acres and farm No. 2 produced an average of 172.5 cwt. on seventy-nine acres. Analyzing the cost items we find that the labor charge per acre was practically the same on the two crops. Farm No. 1 applied manure, had a slightly higher seed cost, a greater cost for sacks and twine because of the larger crop, and a seed treatment charge of $2.05, making a total material charge of $46.18 compared with $34.65 for Farm No. 2. The application of manure, higher seed cost

TABLE 4 Net Return on Two Farms in the Same Locality in 1928

AVERAGE YIELD CWT.	Farm No. 1	Farm No. 2
	224 (403,002 lbs. on 18 Acres)	172.5 (1,362,460 lbs. on 79 Acres)

TABLE 4 Net Return on Two Farms in the Same Locality in 1928

AVERAGE YIELD CWT.		Farm No. 1 224 (403,002 lbs. on 18 Acres)		Farm No. 2 172.5 (1,362,460 lbs. on 79 Acres)	
Average Labor Cost Per Acre	Man	3.03		6.53	
	Horse	3.03		5.43	
	Contract	35.00		29.65	
	Total		41.06		41.61
Average Material Cost per Acre	Manure 50% to Crop	1.25			
	Seed	20.00		18.15	
	Sacks and Twine	22.45		16.50	
	Water	.40			
	Seed Treatment	2.05			
	Total		46.18		34.65
Average Other Costs per Acre	Land Interest	7.50		12.00	
	Taxes	1.00		1.50	
	Use of Machinery	1.20		1.21	
	Storage	1.67		2.03	
	Overhead 10% of Material and Labor	8.72		7.63	
	Total		20.09		24.36
Total Cost per Acre			107.33		100.62
Total Cost per Cwt.			.48		.58
Total Returns per Acre		18 Acres Market 3150 sacks @ $ .65 Culls 100 sacks @ .30 Seed 350 sacks @ 1.25	$153.37	79 Acres Market 2886 sacks @ $ .40 300 sacks @ .75 6700 sacks @ .65 Culls 1800 sacks @ .25 Seed 700 sacks @ 1.00	$94.40
Total Return per Cwt.			.68		.55
Net Return per Cwt.			.20		—.03

and seed treatment may account for the greater yield. In other costs we find that Farm No. 2 had higher priced land, higher taxes and a greater storage cost, making a total charge for other items of $24.36 compared with $20.09 for Farm No. 1. In the marketing summary we again see the result of the better seed and better cultural practices on Farm No. 1 as there are only one hundred sacks of culls out of a total of thirty-six hundred marketed. This is 2.8 per cent.

On Farm No. 2 we find 1800 sacks of culls out of 12,386 sacks marketed or 14.5 per cent. This resulted in a total return on Farm No. 1 of 68 cents per cwt. and 55 cents per cwt. on Farm No. 2. The total cost per acre on Farm No. 1 is $107.33 and on Farm No. 2, $100.62. In other words, No. 1 produced the additional 51.5 cwt. at a total cost of $6.71. Farm No. 1 is an example of modern best methods resulting in a high yield with a low cost of production per cwt. ($.48) on low priced land and excellent quality resulting in little loss and a top price $.68 and a net return of $.20 per cwt. or $44.80. This man had one hundred acres of potatoes which netted him $4,480.00, even in a year when practically every potato grower in the United States lost money. Farm No. 2 is an example of average methods resulting in a fair yield and a fairly low cost of production per cwt. ($.58) on higher priced land with only fair quality resulting in a fair price of fifty-five cents per cwt. and a net loss of three cents per cwt. or $5.18 per acre. Grower No. 1 made $4,480.00 while grower No. 2 lost $408.83. High yields of good quality will make a profit any year. This is the reason for the Colorado 600 Bushel Club, whose slogan is "More U. S. No. 1 Potatoes per Acre."

The "Colorado 600 Bushel Club" was formed in 1927 with the main object of encouraging larger yields per acre, thus lowering the cost of production. The success of the enterprise may be judged by the cost records of L. G. Shutte, who broke the American record with 1145.17 bushels on a measured acre, and that of C. P. McKelvie, Potato King of Rio Grande County, with 917 bushels on a measured acre. Shutte's average yield is 314 sacks, averaging 115 pounds, on 15 acres. His cost is forty-five cents per hundred or twenty-five cents per bushel, total return $2.06, or a net return of $1.61 per hundred. McKelvie's average is four hundred thirteen sacks on four acres. His cost is forty-two cents per hundred or twenty-five cents per bushel; the rest of the record is incomplete as some of the stock is still in storage.

Depth of Planting and Spacing the Seed Pieces

WM. H. MARTIN, Agricultural Experiment Station, New Brunswick, N. J.

The common practice among New Jersey potato growers is to plant rather shallow. The seed piece is covered with approximately an inch and a half of soil with a 4-inch ridge over the row. This is in marked contrast to the practice in nearby states, where it is recommended that the seed pieces be planted three to four inches deep. It should be stated that the New Jersey crop, for most part, is planted during the latter part of March and early April and very frequently the surface soil is frozen after the crop is planted.

In view of the fact that no definite information was available on the best planting depth under New Jersey conditions, a test was conducted in 1929 to obtain information on this point. In this connection it should be said that tests conducted by the Department of Plant Pathology of the N. J. Agr. Exp. Sta. have indicated that depth of planting is important in determining the severity of stem cankers due to rhizoctonia. In a number of tests conducted in the greenhouse and field it was found that when untreated seed potatoes, infected with rhizoctonia, were planted at different depths a considerable difference in stand frequently resulted. In almost every instance the greatest injury to the sprouts resulted from the deeper plantings. This injury was sometimes exhibited in the form of cankers while in other cases the stems were cut off. These tests have shown, likewise, that when clean seed is planted at different depths in soil inoculated with the rhizoctonia organism, the severity of the disease increased as the depth of planting increased. In one test for example, clean seed planted 1½ inches deep in a very dry soil showed 67 per cent clean sprouts while similar seed planted 3½ inches deep produced no clean sprouts.

The results of these tests have likewise demonstrated that, regardless of depth of planting, rhizoctonia is much more serious in soils of low rather than those of high moisture content. In greenhouse tests where comparisons were made of different planting depths in soils of low and high moisture content, the number of stems showing rhizoctonia cankers as well as the number cut off was very much greater in the low moisture series. In the case of the dry soils, the sprouts from seed pieces planted 3½ inches were frequently cut off while the sprouts on seed pieces planted the same depth in wet soils were only slightly injured. Similar relationships have

been observed under field conditions. In years when it is extremely dry following planting, stem cankers are numerous and severe while if wet weather prevails from the time the seed piece germinates until the sprouts have emerged from the ground, the disease is usually of little importance.

In the field test conducted to determine the influence of planting depth on yields, an examination was made to determine the extent of rhizoctonia infection. Only a trace of this trouble was found on any of the sprouts. The failure of the disease to appear, regardless of depth of planting, was attributed to the fact that the soil was well supplied with moisture until after the plants were up.

In this test the Irish Cobbler variety was planted ½, 2 and 2½ inches below the ground level with the regular potato planter. A 4-inch ridge was thrown over each row; this was harrowed off before the sprouts came up. After planting, careful measurements were made of a number of seed pieces to determine the actual depth of planting. It was found that those planted ½ inch averaged slightly under this. In most every case the seed pieces planted 2 inches, averaged this depth while in the case of the 2½ inch plantings, some were slightly less than this depth. Each of the three planting depths were repeated four times and yields were obtained from each of the plots. During the summer, no differences were observed, either in stand or vigor.

The test was harvested on August 13 and the total yields as well as the per cent of tubers over 1⅞ inches in diameter secured. The results are shown in Table I.

TABE I

Depth of Planting	Yield per Acre Bus.	Primes %
½ inch	230.2	82.4
2 inch	213.7	84.8
2½ inch	215.2	85.6

Only slight differences were observed between the 2 and 2½ inch plantings but, as previously pointed out, these two planting depths were approximately the same. The shallow planting showed an increase of 16.5 bushels over the deeper planting the odds being over 100 to 1 that the difference is significant. There was a slight difference in the number of primes but this difference was small and is not considered to be of great importance.

It is not wise to draw conclusions from one year's work, since environmental conditions frequently influence results to a very great extent. In 1929, it became extremely dry shortly after the plants came up and continued this way until the end of the season. It is probably true, however, that in a year of normal moisture the shallow plantings would give as good or better results than in a dry year. We are not prepared to advocate shallow planting as a method of increasing yields under all conditions but in New Jersey, at least, the indications are that such is the case particularly when rhizoctonia is present. Where untreated seed carrying the sclerotial bodies of this organism are planted or where rhizoctonia is present in the soil we believe that even better results will follow shallow planting.

Seed Piece Spacing

Numerous tests have been conducted in the different potato growing sections to determine the most economical planting distance for potatoes. Whether as the results of these tests or the result of actual experience, it is difficult to say, but the tendency in many potato growing sections is toward closer planting of the seed piece. This is apparent from an examination of the records of the 400 Bushel Club members in Pennsylvania. In 1926, the rows averaged 32.4 inches; in 1927, 31 inches, and in 1928, 30.95 inches. It is of interest to note that in the latter year the width of the rows in fields where 500 bushels were obtained was 30.4 inches as compared with 29.4 inches in the case of fields where an average of 600 bushels was obtained. In 1926 the spacing in the row averaged 11 inches; in 1927, 10.5, and in 1928, 9.75 inches. The growers who made 500 bushels planted 9.5 inches in the row while those who made 600 bushels planted 9.2 inches. In Lehigh county the average rows were 31.7 inches apart and the average planting distance 10 inches.

In New Jersey the common practice is to plant the Irish Cobbler variety 13 inches apart, although a few growers still use a 15 inch spacing. The results of many tests indicate that this is not necessary or advisable but, as is generally the case, it is difficult to persuade a potato grower to change from a practice which he has long followed. One way to accomplish this is to demonstrate to the grower, under his own conditions, that it would be to his advantage to make the change. With this thought in mind a spacing test was conducted in 1928. In this test the Irish Cobbler variety was planted 9, 11, 13 and 15 inches apart and the greatest net returns followed the closer planting. In this year there was little or no difference in the number of prime tubers on any of the plots. The year 1928 was very wet, however, and many growers insisted that

in a dry year, the closer plantings would result in a large number of small potatoes. In view of this fact a similar test was conducted in 1929. This test was also conducted with the Irish Cobbler variety. Seed pieces weighing 0.91 ounces were planted approximately 9, 11, 13 and 15 inches apart in 32 inch rows. The crop was planted with the regular planter and the spacings obtained by using the different sized wheels. A 5-8-7 fertilizer was applied in the row at the rate of 2,000 pounds per acre. When the plants were six to eight inches high counts were made on each of the four replications to determine the actual spacing between the plants. This was found to be 9.4, 11.5, 13.4 and 15.7 inches.

The results of this test are shown in Table II.

TABLE II

Average Spacing of Plants	9.4 in.	11.5 in.	13.4 in.	15.7 in.
Bushels of Seed per Acre	19.3	17.0	14.5	12.0
Yield per Acre, Bushels	244.9	233.6	200.4	179.1
Primes, per cent	77.8	74.6	82.9	82.3
Net return over cost of seed	$172.3	$168.2	$164.5	$148.6

It will be seen that as the distance between seed pieces increased the yield decreased, the difference between the 9 and 15 inch spacings being 65.8 bushels per acre. It will be observed, however, that in general, the number of prime tubers, i. e., those being over 1⅞ inches, increased with the wider spacing, there being 4.5 per cent more on the 15 than on the 9 inch spacing. It should be said that 1929 was very dry. In comparing the 9 and 11 inch planting it will be seen that the per cent of tubers is slightly greater for the closer planting. No explanation is available for this difference.

The point of most importance, however, is the relation of planting distance to the returns over the cost of the seed. This is shown in the table and is based on seed costing $6.00 and the primes selling for $3.00 a sack, the second size tubers not being included. As in the case of total yields, greatest returns followed the closest planting, there being a difference of $23.70 between the 9 and 15 inch spacing.

These results are in accord with findings of similar tests and with the results obtained by potato growers elsewhere who are producing large yields. It is true that yields following close planting are to a large extent governed by soil fertility but we assume that the wise potato grower will not plant potatoes on soil not adapted to the crop. From the results of these and similar tests we are convinced that for New Jersey conditions at least, it is unnecessary to plant the Irish Cobbler variety 13 inches apart. Better results will follow the eleven

inch spacing and, where the soil is well supplied with humus and heavy applications of fertilizer are made, it is possible that still closer spacing could be adopted to advantage.

These two questions, depth of planting and spacing of the seed pieces are important and should receive every grower's consideration. In those sections where rhizoctonia is severe it would be particularly advisable that the grower consider the possibility of shallow planting as a means of reducing the losses from this disease. We are not prepared to say that this will be found to be satisfactory under all conditions but it would be well for the grower to determine this for himself. In the event that shallow planting is not found to be satisfactory, the same results should follow from deep planting with shallow covering. Under this system the sprouts will soon come up and the same effect should be secured as in the case of shallow planting. When the sprouts are up they can then be covered with additional soil so that any objections to shallow planting will be overcome. This method, deep planting with shallow covering, may be accomplished by the proper adjustment of the potato planter. In many localities closer planting should likewise result in more economical production; this applies particularly to those sections where hollow heart is common. The adoption of these practices where feasible, together with the use of good seed, proper cultural methods and thorough spraying for the control of insects and diseases will lead to larger yields of better potatoes. If the potato growers could learn to do this and at the same time reduce the acreage planted, but little difficulty would be experienced in disposing of the crop at a profit.

Potato Seedbed Preparation and Planting

R. U. BLASINGAME, State College, Pennsylvania

There are several hundred 400-bushel potato growers in Pennsylvania. Even though the soil varies greatly in various sections of the state, these men consistently produce from year to year high yields no matter what the season may be. They employ largely the system worked out by Dr. E. L. Nixon, plant pathologist at the Pennsylvania State College.

This discussion will be devoted to seedbed preparation and planting. Most of these 400-bushel men employ either soy beans or sweet clover as cover crops preceding potatoes. They do not cut the legumes for hay, do not harvest for seed or pasture them, but turn the whole crop under.

They often turn under the beans with a plow or cut them into the seedbed with a heavy cover-crop disk. This means a California type of disk with blades 22 to 24 inches in diameter, spaced 9 inches apart. A regular disk harrow will not do the work. If the beans are disked in rather than plowed, the disking is usually done both ways.

They plow the land again at planting time 8 to 9 inches deep, disk and spring tooth harrow. Immediately before planting, often the same day, they run a deep tillage chisel or orchard harrow 10 to 12 inches deep. They do not use a roller or cultipacker. The deep tillage machine will not turn up the subsoil but mix the cover crop with the seedbed. Clods will be on top where they should be and the seedbed will be rough and altogether differed from that for corn and small grain.

In case of sweet clover, the land is plowed in the spring after a 2 to 4 inch growth has been attained. By allowing the clover to grow before plowing it will be killed and not troublesome as a weed. They disk the ground with the cover-crop disk, then they spring tooth harrow and chisel below plow depth the day the planting is done.

A plank dragged behind the chisel or orchard harrow will smooth out the slight ridges left.

Planting

Something like fifty per cent of these growers use the same type of planter. This planter is made in both automatic and assisted feeds. The opening device consists first of two disks set to throw the soil out. The fertilizer is deposited on each side of the ridge left by these disk runners. This is followed by a shoe runner which throws out the ridge, mixing the fertilizer with soil. The trench is 3 to 4 inches deep into which certified seed is planted. Two covering disks follow which may be set to cover either deep or shallow. Shallow covering seems to give best results because the warmth of the sun brings the plants out of the ground quickly.

If the soil is fertile the seed pieces are usually spaced from 8 to 10 inches apart in the row. As a rule from 800 to 1,000 pounds of commercial fertilizer of a standard potato formula is employed.

As the weeder and cultivator are used, soil is thrown to the plants securing deep planting. All of the potatoes produced by a plant are formed above the seed piece thus the deep planting. This can only be done in a deep loose seedbed prepared in the manner described above.

Weeding, cultivation and spraying will be discussed in subsequent articles.

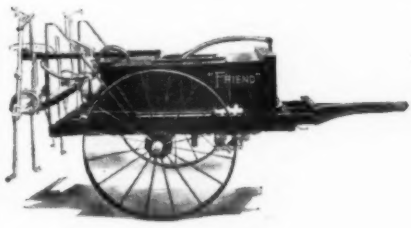
Crop and Market News

Prices of Old Potatoes Advance

(Contribution from Bureau of Agricultural Economics)

There was still every indication that the supply of early southern potatoes would be quite liberal. With larger acreage but decreased average yields, the Florida crop is forecast at 2,480,000 bushels or nearly as many as last season. The lower valley of Texas shows a 50% increase in production, or a total of 1,445,000 bushels. The other early shipping states together report a general increase of 8% in plantings this season. And now the second-early group, from Maryland and New Jersey westward to Kansas and Nebraska, shows an intended increase of 5% over the 1929 acreage for this group. But this would be 17% less than the exceptionally large plantings of 1928.

Condition of the potato crop in South Carolina is reported to be good, and first shipments are expected by May 10. Acreage was slightly increased in South Carolina this year and was considerably increased in North Carolina. General condition of the early crop in eight states at the opening of April was 80% of normal,



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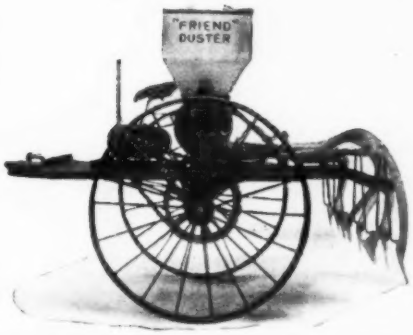

or only two points lower than a year ago. Florida showed lowest condition of 68%, while the range for all other states was between 81 and 86.

By mid-April, Florida was shipping an average of 60 cars daily and southern Texas about 45 cars each day. Alabama was soon expected to start, although cold weather delayed the crop there. F. O. B. prices of best Spaulding Rose potatoes in the Hastings district of Florida had declined to $6 per barrel, with sacked Triumphs in the Rio Grande Valley of Texas at $3.50 per 100 pounds. Peak movement in the valley was anticipated about April 20. Quality of the Florida stock was improving. Some of the earlier shipments showed considerable dirty potatoes, as a result of weather and soil conditions. City dealers were getting mostly $6.50-$8 per barrel of U. S. No. 1 Spaulding Rose from Florida, or $2.40-$3.25 per bushel crate of Bliss Triumphs. Cuban Triumphs in 50-pound boxes sold at $2.25 -$2.75 in New York. Barrels from Bermuda were at a jobbing level of $7. Texas Triumphs were weaker at $4-$6 per 100 pounds in consuming centers, with some sales as low as $3.25.

OLD POTATOES CLEANING UP

Supplies of 1929 potatoes in storage were rapidly diminishing. Western stocks were expected to clean up before the eastern holdings. During the second week of April, a sudden decrease of one-third occurred in the weekly forwardings from late or main-crop states, so that the daily average was reduced to 500 cars. Maine's output had reached the high total of 51,000 cars by mid-April, and Minnesota had exceeded 22,000 cars. The season total from all important states together was running 20,000 cars ahead of last year's corresponding figure.

Following a prolonged period of weakness, market prices began to advance during late March and the upward swing seems to have spent itself in some shipping districts by the middle of April. Conditions lately have been unsettled, with slight additional advances in some sections but slight declines elsewhere. With the increasing volume of new southern stock, it is doubtful whether the market for old potatoes will go much higher.

Advances during the past month have ranged from 30c to 75c per 100 pounds in important shipping areas and were fully 50c in terminal markets. Russet Burbanks in the Yakima Valley of Washington went up $10 a ton to an f. o. b. range of $60-$62.50 per ton. The general level at shipping points in western states was $2.50-$3.15, compared with the f. o. b. range of $2.40-$2.90 in the North Central area. Prices of Green Mountains in northern Maine were at the lowest level of $2.55-$2.60, while shippers of Round Whites in western New York received $2.85-$3 per 100 pounds. The Chicago carlot market on northern Round Whites

had advanced to a range of $2.65-$2.90, with Idaho Russets selling at $3.75-$3.90. In eastern jobbing centers, old potatoes were bringing mostly $2.90-$3.85. Green Mountain seed stock from Prince Edward Island ranged $3.55-$3.65 per 100 pounds in New York City.

Notes

CALIFORNIA

SHAFTER POTATO DISTRICT

The Shafter Potato District in Kern County, California, is an important item in California potato production. Between 1000 and 1500 acres are planted annually, but in 1930 the latest estimate is 1762 acres. Potatoes are all produced under irrigation and about 20 growers raise 75 per cent of the crop. The remainder is grown in small patches of from 1 to 5 acres.

The movement of Shafter potatoes begins about May 15 with heaviest harvesting in mid-June, and the close of harvesting about July 1. About 95 per cent of these potatoes move in carlots. They are sent to the northwest markets including Seattle and Portland, and east to the Rockies and into Texas. From the movement dates, it is apparent that they come in between the Texas movement and the movement from Stockton, California.

The potato growers in this section are not one-crop farmers. Their farms are well diversified. One finds deciduous fruit crops, vineyards, mint, onions, alfalfa, and several other truck crops being raised in this area.

The principal problem of this section in a marketing way is a distribution problem. Prices usually start off high early in the season; growers stop watering their potatoes and dig them rapidly in order to take advantage of high prices. In so doing they soon overload their markets. At the present time the growers are considering a clearing house organization similar to that of the Imperial Valley lettuce and cantaloupe clearing house, which will aim to control shipments.

—E. A. STOKDYK.

CANADA

A change has been made in section V of the general regulations under the Destructive Insect and Pest Act as applying to seed potatoes. The section referred to now reads as follows:

V. An inspector shall have the power to inspect before export to any foreign country, or shipment within the Dominion, any plant, and to grant a certificate according to the requirements of any country demanding such, or for domestic purposes.

All certificates so issued must bear a copy of the official seal of the plant disease or insect pest inspection service carried on under this act.

In the case of potatoes, no person shall be allowed to sell or offer, or advertise, expose or hold in possession for sale, any potatoes in any manner or form described or designated as certified, inspected, registered, selected, disease-free, or otherwise indicating their suitability for seed or seed purposes, unless such potatoes have been inspected in the field and after harvest by an inspector under the Destructive Insect and Pest Act and have been found sufficiently vigorous and free from serious diseases, to warrant them being classed into either of the two following grades, viz. Certified Seed Potatoes Grade Extra No. 1, or Certified Seed Potatoes Grade Small Sized (1½-3 ounces only).

Certified seed potatoes must be contained in sacks, barrels or other containers, to each of which shall be durably attached a certificate in the form of an authorized official tag, issued by an inspector, and bearing the growers name or number.

This amendment gives effect to two important changes in the operation of the act as applying to seed potatoes:

(1) Only Government Certified Seed potatoes can now be sold as seed within the Dominion.

(2) A second grade—small sized 1½-3 ounces, is made legal, the original grade Extra No. 1 remaining as before.

—JOHN TUCKER.

COLORADO

Who will be the Colorado boy or girl to produce the most potatoes from a measured acre of land in 1930?

To the youth who obtains the highest yield, a handsome silver trophy will be presented by Dr. E. P. Sandston, state horticulturist at the Colorado Agricultural college.

Conditions of the state-wide contest which will result in the selection of the prize-winner are announced as follows:

The boy or girl must be under 18 years of age and must be a regularly enrolled member of a 4-H club or a Smith-Hughes project.

Any standard variety of potato may be grown, and any youth in any section of the state may enter.

The acre must be measured and the potatoes weighed according to the rules of the Colorado 600-Bushel Potato club, and under the supervision of the county extension agent and club leader, or county agent and the Smith-Hughes high-school teacher of vocational agriculture.

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The report form for the 600-Bushel club must be filled out and signed by the county agent, club leader or Smith-Hughes teacher and the contestant.

The potato plot must be the contestant's own, and entries must be submitted to George Beach, extension horticulturist at the Colorado Agricultural college at Fort Collins, by June 15. All contestants who produce over 600 bushels to the measured acre will become full-fledged members of the state 600-Bushel club—a rare honor.

—C. H. METZGER.

CONNECTICUT

Planting Potatoes

Profitable yields are the result of attention to details. A few important points are:

Planting at just the correct time. Green Mountains, May 10 to 30; Irish Cobblers, April 1 to 20.

Using the correct size seed pieces, one ounce to 2 ounces. This size or weight is more important than the number of eyes, provided one good eye is on every seed piece.

Cut seed is better than whole seed, because it gives large yields.

The so-called seed end of the potato is more productive than the stem end.

There must be enough plant food and vitality in the seed piece to maintain the sprout while it pushes its way up through the soil and until the plant has leaves to maintain itself.

Careful hand cutting of tubers has given higher yields than machine cutting. Just how to cut by hand—begin at the stem end, cutting diagonally across the potato above the eye, toward the center and towards the stem end. Cutting medium sized potatoes into four pieces lengthwise is a quick, efficient method. A knife firmly fastened in a board, bench or barrel aids fast, accurate cutting of tubers.

Seed freshly cut and planted outyields previously cut and held seed. About 16 bushels of seed are needed to plant an acre in three foot rows, each piece 12 inches apart.

The correct depth to plant seed pieces is in light soils 3 to 4 inches, in heavy soils 2 to 3 inches.

A full stand of plants is needed in order to obtain the best results.

Thorough mixing of the fertilizer in the soil prevents root burning and promotes rapid growth of the plant.

—ALBERT E. WILKINSON.

LOUISIANA

The first Field Day and Tour will be held at the Federal and State Potato Experiment Station, at Houma, April 29-30. Tests being conducted with potatoes from various states and the fertilizer experiments being run, as well as flourishing fields in the parishes of Lafourche and Terrebonne will be studied. Dr. William Stuart of the U. S. D. A. will be one of the main speakers. Formation of a Louisiana Potato Improvement Association will be discussed at this meeting.

On the first day the station will be visited and a number of farms in Terrebonne will be inspected. This will follow the program which will be featured by talks made by Dr. Stuart, President T. W. Atkinson, Louisiana State University, and Dr. C. T. Dowell, dean of the College of Agriculture. On April 23 those in attendance will make a tour of potato fields in Terrebonne and Lafourche.

This will mark the first meeting of this kind since the formal opening the station and it is believed that there will be a large crowd in attendance, say those in charge. Every effort is being made to reach all farmers of Louisiana who are interested in growing potatoes.

—N. M. HULL.

VERMONT

A sub-committee of the Vermont Commission of Country Life, which is making a thorough survey of rural life in the state, has been appointed to make a thorough investigation of the potato situation and its possibilities in Vermont. The questions which it has taken up for first consideration are:

1. How many potatoes are brought into the state to supply Vermont markets?

2. How many potatoes are shipped out of the state to other markets?

3. Geographical and topographical features of the state in relation to profitable potato production.

4. Fancy packaging of potatoes and other market demands.

5. Influence of quality, especially of grading, on marketing Vermont potatoes.

6. Should potato production in general in the state be expanded and what are the possibilities for the expansion of the certified seed industry in the state?

Although Vermont is not a large potato producing state, the 3,000,000 bushels which it is credited with should be much more than sufficient to feed its population. Nevertheless it is known that many carloads are brought into the state each year. How many and why, and what can be done to divert our own potatoes

to our own markets and thereby save loss in transportation constitute the most important problem for the committee to solve.

An important step in Vermont certification has been taken by the State Department of Agriculture in establishing a centralized sample-test plot. Each grower will be required to submit a sample consisting of 100 tubers from each seed lot which he intends to plant for certification. These will be grown under the supervision of the Inspection Service. In cases where two or more growers use seed from exactly the same source, only one sample will be required. Also, each grower will be required to plant at least 100 tubers in tuber units in his field or in a seed plot. This will stand as a check against the sample in the centralized plot.

Approximately the same acreage is expected for enrollment for certification this year as last—approximately 1,000 acres.

—HAROLD L. BAILEY.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of American Potato Journal, published monthly at East Lansing, Michigan, for April 1, 1930.

Before me, a Notary Public in and for the state and county aforesaid, personally appeared H. C. Moore, who having been duly sworn according to the law, deposes and says that he is the Editor of the American Potato Journal and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Potato Association of America, East Lansing, Michigan.
Editor—H. C. Moore, East Lansing, Michigan.
Managing Editor—.
Business Manager—.

2. That the owner is (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given).

Potato Association of America, East Lansing, Michigan.
John Bushnell, Wooster, Ohio.
John S. Gardner, Lexington, Ky.
H. C. Moore, East Lansing, Mich.
J. R. Tucker, Ottawa, Canada.
E. A. Stokdyk, Berkeley, Cal.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state). There are no bondholders, mortgagees, etc.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders or security holders appears upon the books of the company as a trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given: also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities, in a capacity other than that of a bona fide owner and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is—(This information is required from daily publications only).

H. C. MOORE, Editor.

Sworn to and subscribed before me this 20th day of March, 1930.

B. A. FAUNCE, Notary Public.
(My commission expires April 12, 1930.)
Form 3526.—Ed. 1924.

Review of Recent Literature

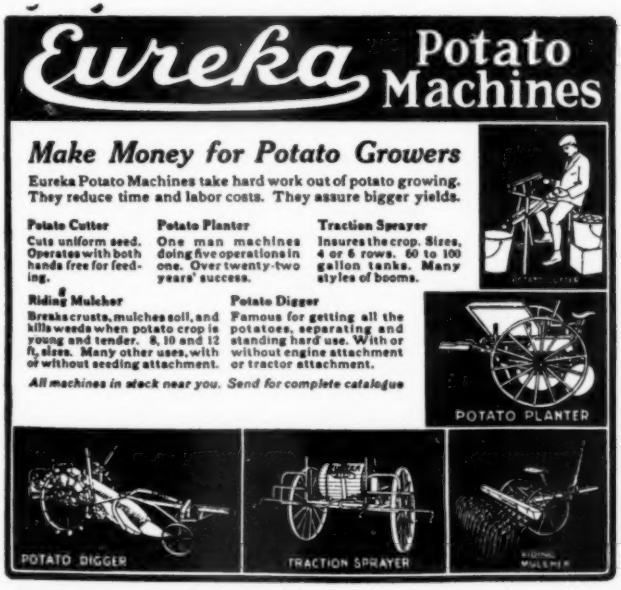
SMITH, ORA. Effects of Various Treatments on the Carbon Dioxide and Oxygen in Dormant Tubers. Hilgardia 4: 273-306, Dec. 1929.

The White Rose and Irish Cobbler varieties were used and an attempt made to ascertain what effect different treatments of the tubers had upon the rate of loss of carbon dioxide and absorption of oxygen, the composition of interior gas of the tubers, the permeability of the periderm to gases and the length of the rest period. The treatments included harvesting at various stages of maturity, subjecting the tubers to ethylene chlorhydrin vapor for 24 hours, dry and moist storage, storage in air of high oxygen percentage, and peeling the tubers.

Chemically treated tubers were subjected to 0.75cc of 40 per cent ethylene chlorhydrin per liter of space for 24 hours.

Tubers of the dry-stored lots were stored in shallow wooden trays and those of the moist-stored in wooden boxes in well leached moist sphagnum moss.

Dry and moist tubers were placed in respiration jars containing air with 20.6 per cent and 60 per cent oxygen with and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without the accumulation of carbon dioxide. The permeability of the periderm of the tubers to gas was determined by withdrawing the gas from the tubers in a vacuum from whole uninjured tubers and from peeled tubers.

The respiratory gases were analyzed for carbon dioxide and oxygen with the Orsat gas analysis apparatus. The gases extracted from the tubers into a vacuum were analyzed for carbon dioxide and oxygen with a modified Henderson Respiratory Gas Analyzer.

Immature tubers of both varieties exhibited a higher respiratory activity at time of digging than those harvested more mature. White Rose tubers were found to have a higher respiratory activity and a shorter rest period than the Irish Cobbler tubers. The rest period of potato tubers was shortened and a striking increase in rate of loss of carbon dioxide resulted from treating with ethylene chlorhydrin and holding them in moist storage. Chemical treatments and moist storage was also found to facilitate the exchange of gases in potato tubers. Tubers stored moist at 25°c in jars of air of 60 per cent oxygen absorbed much more oxygen than dry-stored tubers. Moist tubers were found more permeable to carbon dioxide and oxygen than dry tubers. Comparison of peeled and unpeeled tubers indicated that the periderm offers resistance to the passage of carbon dioxide and oxygen, and also that the passage of gases is retarded by the interior tissue of the tubers.

—W. STUART.

McINTOSH, T. P. Surplus Potatoes II. Industrial Uses, General Policy and Marketing. Scottish Jour. Agr. 13: 37-43, Jan. 1930.

The author discusses his subject under the following headings: "The Nature of the Surplus"; "The Feeding of Potatoes to Stock"; "Industrial and Other Products of the Potato"; "Starch"; "Dried Potatoes"; "Acetic Acid"; "Silage"; "The Possibilities of Increasing the Demand for Home-Grown Potatoes"; "Extension of Time During Which Maincrop Potatoes are Eaten"; "Exports"; "Marketing"; "Grading" and "Organization." His chief conclusions are that the simplest method of using unsalable potatoes is to feed them to stock in either the raw or dried condition. That potato silage may be a useful stock food and suggests that its use and methods of preparation should be investigated. Other suggestions are that the demand might be increased by concentrating on cooking quality rather than yield of new varieties; by increasing exports, especially of seed and by more intelligent marketing methods. The better grading of seed and ware in surplus years is recommended as a possible means of preventing inferior material from coming to market.

—W. STUART.